

THRESHOLD FEAR CONDITIONING

MED-STATE NOTATION™ PROCEDURE

SOF-700RA-14 Manual
DOC-142
Rev. 1.1

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CHAPTER 1

Introduction

The purpose of this manual is to give an explanation of the MED State Notation™ Procedures that comprise the SOF-700RA-14 Threshold Fear Conditioning Procedures. The files in this package can be found on the disk provided by MED Associates, Inc.

These procedures are intended to be run in MED Associates MED-PC® IV software. The latest version of MED-PC® IV gives researchers the ability to use pre-programmed procedures such as these to make hardware control and data collection easy. These pre-programmed procedures can also be modified to meet the evolving demands of a research protocol. Again, it is the intent of this manual to explain exactly what these procedures implement, and provide guidance into how to interpret what the program code achieves in order to let the user determine how to modify them to match their research protocol demands. The manual provides some examples of editing and modifying the procedure's programming code. The manual also defines the elements in the raw data file produced by these procedures.

In addition to this manual, refer to the **MED-PC® IV User's Manual** for the installation of the MED-Associates interface drivers, the MED-PC IV Software, and the Delphi® Compiler. Also refer to the User's Manual for instructions on developing a Hardware Configuration. Data file structure, file-saving format, and other related options are also determined by the Hardware Configuration. Running the Hardware Configuration software utility that accompanies MED-PC IV sets the Hardware Configuration. Its purpose is to assign the inputs and outputs on the interface cards in the interface cabinet for each task controlled by MED-PC IV. The particular type of interface card that is supplied in the interface cabinet may vary; please refer to the User's Manual provided for instructions on how to configure the type of card that is in the cabinet. A valid Hardware Configuration must exist in order for MED-PC IV to interface correctly with the MED Associates, Inc. hardware. This means that one should take the time to create a valid Hardware Configuration before attempting to run the procedures included in this package.

Should there be any problems, the staff at MED Associates, Inc. is available to answer any questions that may arise. Please e-mail us at support@med-associates.com with a detailed description of the problem or desired goals so that concise and detailed information may be provided.

The Threshold Fear Conditioning procedures are designed to be as easy to use as possible. MED Associates, Inc. understands that researchers do not have the time to devote to programming and hardware design, and for that reason, we have undertaken that burden for you. We sincerely hope that you are satisfied with the products and services we provide, and look forward to meeting your future experimental needs as your research program evolves.

Overview of the Procedures

This package contains two Fear Training procedures and two Fear Test procedures for use with the Threshold Fear Conditioning systems and Threshold Activity software. The Fear Training 1.mpc and Fear Test 1.mpc procedures are written for systems equipped with the Programmable Audio Generator (ANL-926) and all of the procedures are written for systems equipped with the Computer-Controlled Constant Current Aversive Stimulator (ENV-413).

Fear Training 1.mpc is a standard training protocol that waits 120 seconds after the start is issued to turn on a tone for 30 seconds. During the last two seconds of the tone, the foot aversive stimulation is turned on. The tone and the foot aversive stimulation are turned off simultaneously. The animal is left in the chamber for an additional 30 seconds.

Fear Training 2.mpc is an alternative training protocol that waits 30 seconds after the start is issued to turn on a 2 second foot aversive stimulation. After waiting 60 seconds, a second 2-second foot aversive stimulation is issued. The animal is left in the chamber for an additional 30 seconds.

Fear Test 1.mpc is a conditioned stimulus test protocol that has a 3-minute baseline followed by a 3-minute tone. Fear Test 2.mpc is a no conditioned stimulus test protocol that runs for 5 minutes.

CHAPTER 2

Getting Started

Software Installation

Please refer to the **MED-PC IV User's Manual** for a complete guide to installing the MED-PC IV software, building a valid Hardware configuration with the Hardware Configuration utility, and opening and compiling a MSN procedure in the Trans-IV utility.

To install the Threshold Fear Conditioning Procedures, insert the CD into the CD-ROM drive and click **Install Threshold Fear Conditioning**. The procedures are copied into the C:\MED-PC IV\MPC folder.

Backing Up the Software

Med Associates strongly encourages creating backup copies of the programs in case of disk failure. Having copies of the original programs may be useful in the future should modifications be made to the existing programs.

CHAPTER 3

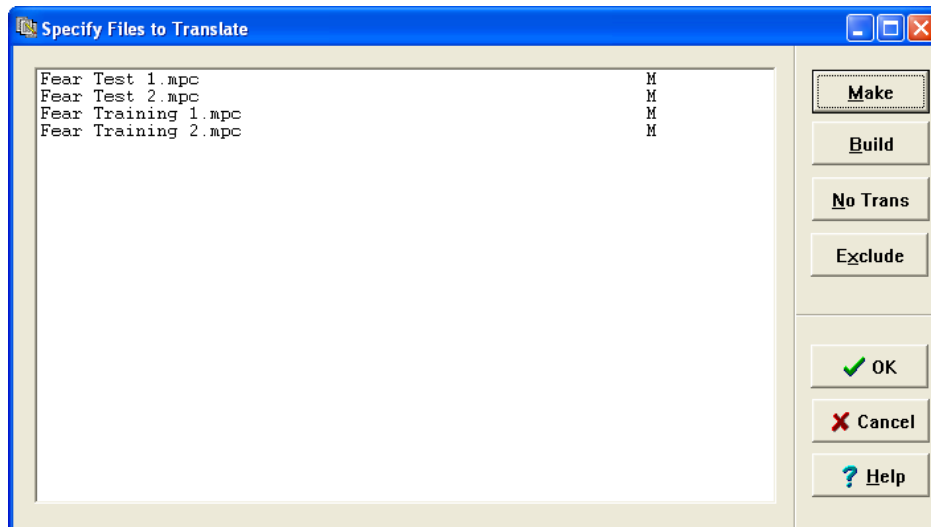
Beginning & Running an Experiment

Translating the MED-PC IV (.mpc) File

Programs written in MedState Notation must be translated using Trans IV before they can be executed in this application. Be sure that a copy of the file being translated is present in the directory "C:\MED-PC IV\MPC\." Open Trans IV icon and select **Translation | Translate and Compile**.

Select the program(s) to use for the experiment and click **M**ake. Click **OK** to start the translator, and it will automatically parse the MedState Notation and then open to a DOS screen to compile the Pascal code. Depending on the speed of the computer, each of these steps may not be seen. If any problems are encountered during this process, refer to the on-screen help menu or the **MED-PC Version IV User's Manual**, or contact MED Associates, Inc. for assistance.

Figure 3.1 - Trans IV Control Panel for Translating and Compiling MedState Notation Code



Using the MED-PC IV Load Wizard

MED-PC IV is designed to help the researcher run an experiment by guiding selection choices through its Experiment Loading Wizard. This section will describe how to initiate the Fear Test 1.mpc application, however the following steps that will also apply to all other .mpc procedures.

Open MED-PC IV and the MED-PC Experiment Loading Wizard's Welcome screen, shown in Figure 3.2 will appear.

Figure 3.2 - The MED-PC IV Loading Wizard Welcome Screen



To avoid this load wizard, deselect the checkbox labeled **Run this experiment automatically when starting MED-PC**. Close this screen by clicking the **Close** button. Closing this screen immediately reveals the MED-PC Run-Time Screen shown in Figure 3.9. If the choice to continue with the Loading Wizard is made, then click the **Next** button.

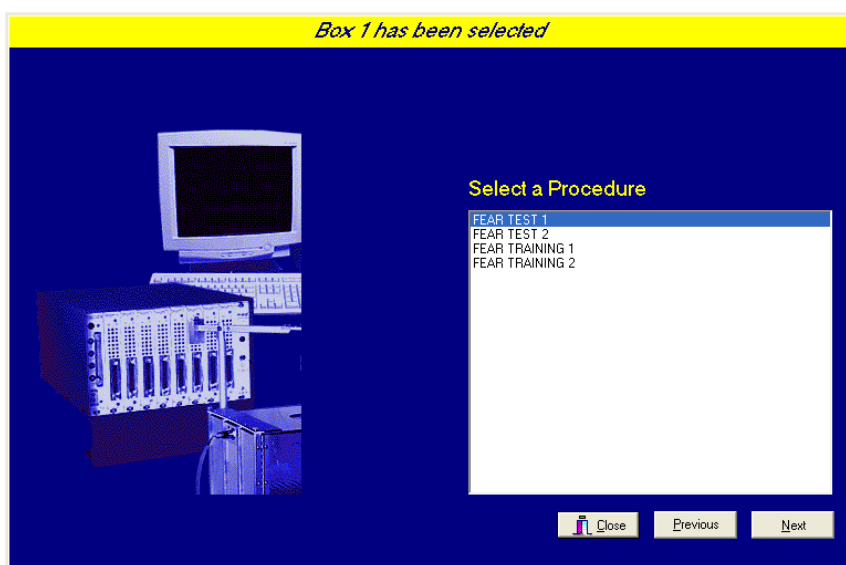
The Box Selection screen will appear next, as shown in Figure 3.3. From this screen the researcher chooses which boxes will be used in the experiment. Select the boxes that will run the experiment by clicking in the radio button next to the box number. The figure shows that the Hardware Configuration included only 1 box, which was selected. Click **Next** to continue.

Figure 3.3 - The Box Selection Screen



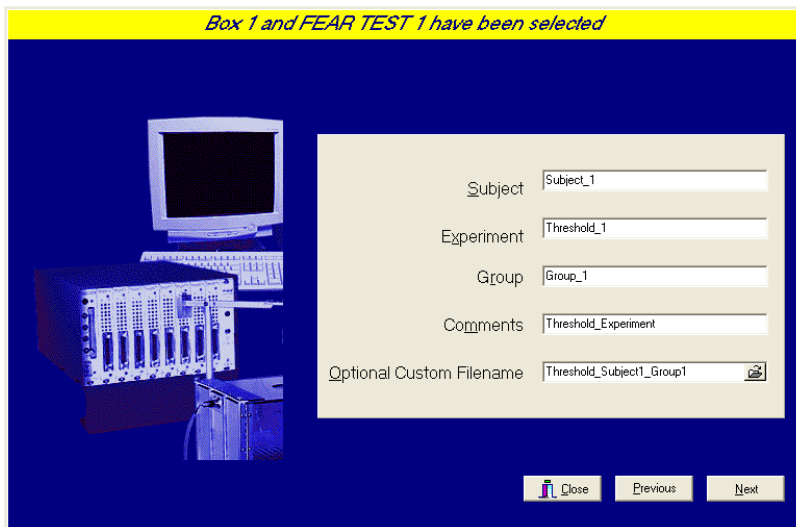
The Select a Procedure screen appears next, as seen in Figure 3.4. This is where the application to be run is selected. The screen displays a list of all the currently compiled procedures. Select the desired procedure and then click **Next**.

Figure 3.4 - The Select a Procedure Screen



The Enter Experiment Data Screen should display next, as shown in Figure 3.5. The purpose of this screen is to allow annotations to be added to the data file that is produced by MED-PC IV. These annotations will help identify the Subject, Experiment, and Experiment Group upon which data was collected. Comments can be added here as well, and the data file can be given a customized file name to help identify it from other data files. Enter the information desired, and click **Next**.

Figure 3.5 - Enter Experiment Data Screen



Box 1 and FEAR TEST 1 have been selected

Subject: Subject_1

Experiment: Threshold_1

Group: Group_1

Comments: Threshold_Experiment

Optional Custom Filename: Threshold_Subject1_Group1

Close Previous Next

The next screen to appear is the Review Choices screen, as seen in Figure 3.6. This is a method of confirming that the information received from the Box/Procedure Selected is correct. If it is not correct, select **Previous**, and edit the data. If it is correct, select **Next**.

Figure 3.6 - Review Choices Screen



Review Choices

Review the data below.

Box: 1

Procedure: FEAR TEST 1

Subject: Subject_1

Experiment: Threshold_1

Group: Group_1

Comment: Threshold_Experiment

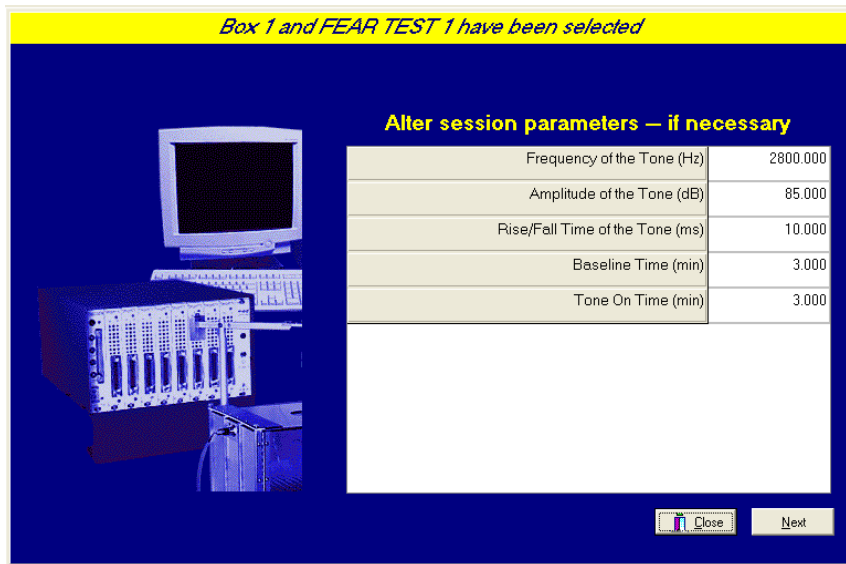
Filename: Threshold_Subject1_Group1

Click "Next" to finish loading the box
or "Previous" to correct errors.

Close Previous Next

The Alter Session Parameters Screen, shown in Figure 3.7, is the next screen to appear, and is an important screen for the researcher. The Alter Session Parameters screen allows the researcher to alter the parameters by which a procedure executes. The Send Start Command Screen appears next. The options available on the screen vary depending upon how many boxes are described in the Hardware Configuration.

Figure 3.7 - Alter Session Parameters Screen



In this example only 1 box is described in the Hardware Configuration, so Figure 3.8 will appear next. If more than 1 box is in the Hardware Configuration, then Figure 3.9 will appear.

Figure 3.8 - Send Start Command Screen for Single Box Configuration

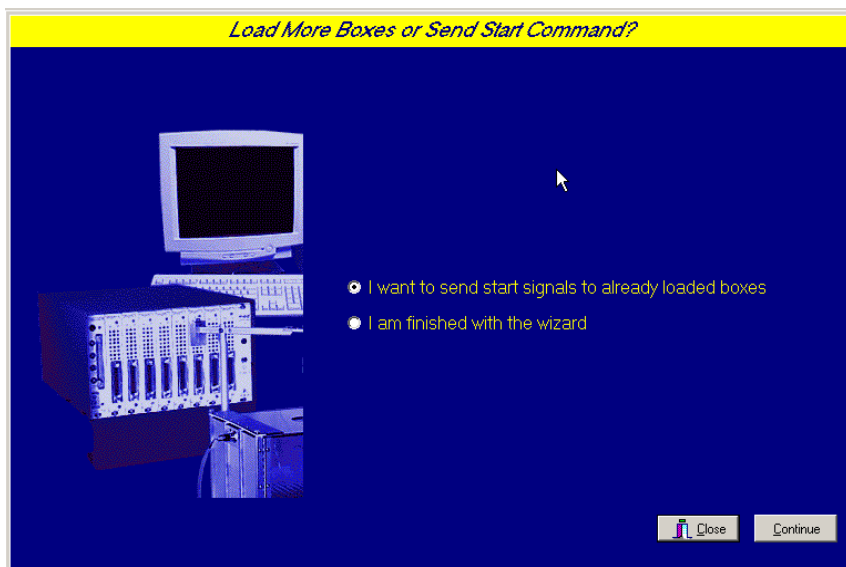
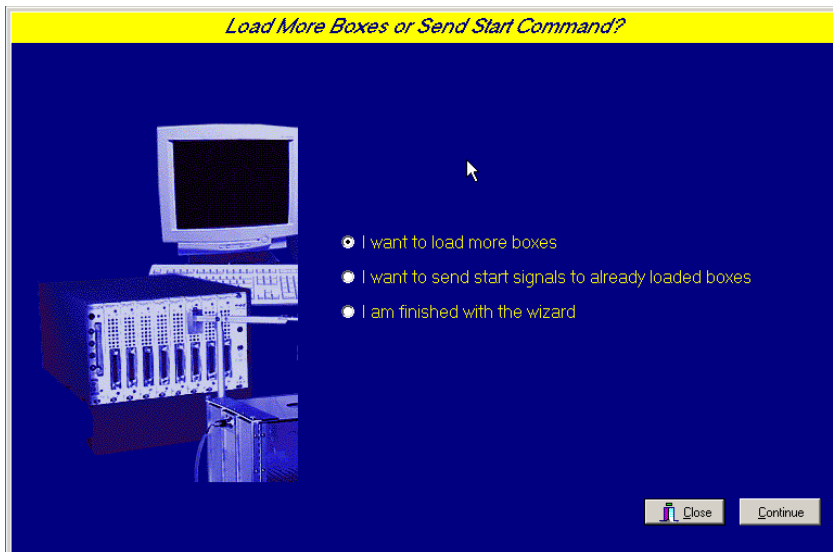
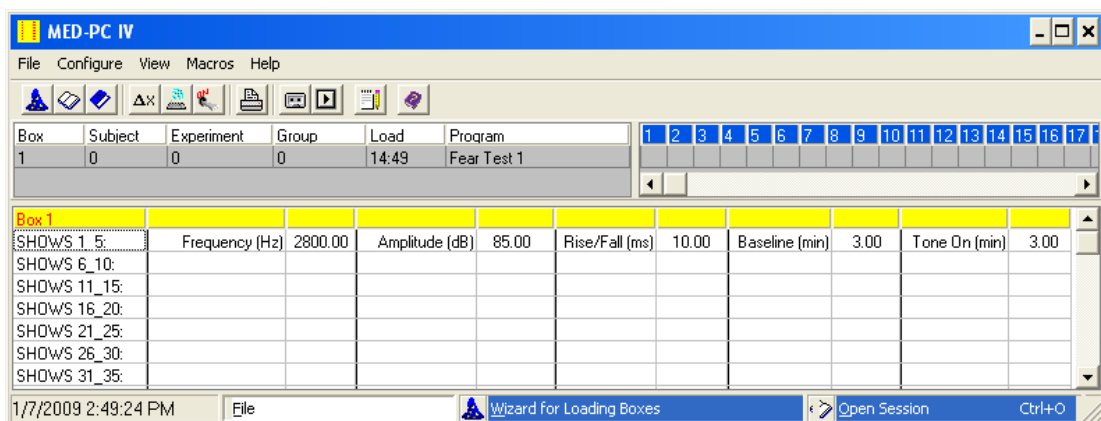


Figure 3.9 - Send Start Command Screen for Multiple Box Configuration



In both cases (Figure 3.8 and Figure 3.9), the screens are where the researcher decides to either load more boxes, send a start signal to boxes that are already loaded, or enter the MED-PC IV run-time environment without sending a start signal by selecting "I am finished with the wizard". This option results in the screen shown in Figure 3.10.

Figure 3.10 - The MED-PC IV Run-Time Screen



Viewing/Changing Variable Values

Before a “start command” has been issued, any variable may be changed on the MED-PC IV run-time screen. Simply highlight the value to change, and then enter the new value. Once a session is in progress, change variables by selecting **Configure | Change Variables**, or click the 4th tool bar item **ΔX**. In the lower left hand corner of the Change Variables window, find the “Display Data from Box” display, and choose the chamber(s) to modify. By clicking additional boxes in the “Additional Boxes to Update” section, changes made to a single box are automatically loaded to all of the selected boxes.

Figure 3.11 - Changing Variables Screen

Displaying Variables from Box 1				
A: 2800.000	B: 85.000	C: 10.000	D: 0.000	E: 3.000
F: 3.000	G: 0.000	H: 0.000	I: 0.000	J: 0.000
K: 0.000	L: 0.000	M: 0.000	N: 0.000	O: 0.000
P: 0.000	Q: 0.000	R: 0.000	S: 0.000	T: 0.000
U: 0.000	V: 0.000	W: 0.000	X: 0.000	Y: 0.000
Z: 0.000				

Named Vars
Vars
Refresh
Issue
Close
Help

Display Data from Box: ☒ 1

Additional Boxes to Update: ☐ 1
Select All Deselect All

A from Box 1: 2800.000

To change a value, simply highlight and replace the value in the lower right hand box or use the up/down arrows to increment by 1. Click the **Issue** button for the change to take effect. Click **Named Variables** to produce the display in Figure 3.12. Change variables here as needed.

Figure 3.12 - Displaying Named Variables from Box 1

Displaying Named Variables from Box 1	
Frequency of the Tone (Hz)	2800.000
Amplitude of the Tone (dB)	85.000
Rise/Fall Time of the Tone (ms)	10.000
Baseline Time (min)	3.000
Tone On Time (min)	3.000

Named Vars
Vars
Refresh
Issue
Close
Help

Display Data from Box: ☒ 1

Additional Boxes to Update: ☐ 1
Select All Deselect All

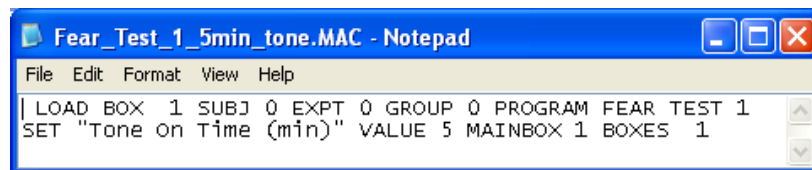
A from Box 1: 2800.000

Macros

The simplest way to initially create a macro is to record keyboard functions while performing the steps manually. Once the commands are in the macro, it is easy to create a number of macros with the macro editor. The following example illustrates the process of loading "Box 1" and changing the Tone on Time to five minutes.

To begin, open MED-PC IV and going directly to the run time screen. Close the load wizard, if present. Before loading or opening the procedure, click **Macro** on the main menu and select **Turn On Macro Recorder** or click the 8th tool bar item with the cassette tape icon on top. A note on the bottom of the display indicates that the recorder is running. Open "Fear Test 1.mpc" by clicking **Files | Open Session**. Change the variables using any of the methods described above. When all settings have been made, turn the recorder off again by using the main menu or tool bar. Save the macro with a distinctive name. The example in Figure 3.13 was named "Fear_Test_1_5min_tone.mac" since the Tone on Time was changed to five minutes.

Figure 3.13 – Fear_Test_1_5min_tone.mac

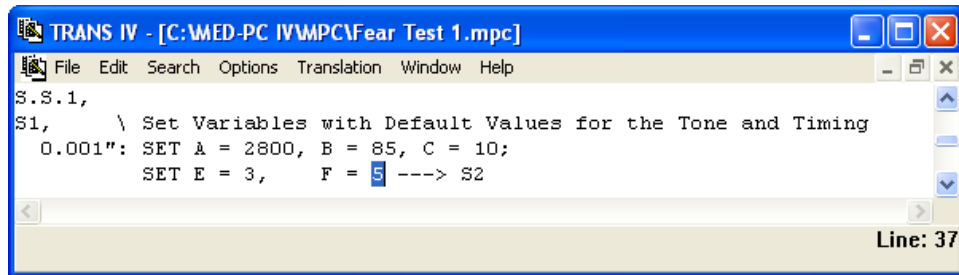


Once this macro is built, use the macro editor to make simple changes such as replacing reward or correct lever values. Review the Help file on screen or the **MED-PC IV User's Manual** for more information on macros and the features offered. A START command or message box followed by a START command could be added to the macro (it was left off here so changes could be verified before starting the procedure).

Modifying the MedState Notation™ Code

Permanent changes to the Threshold procedures can be made to the MedState Notation code. To make the same change to the Tone on Time as shown above, do the following. Open Trans IV and select **File | Open** to place Fear Test 1.mpc into the text editor. Scroll down to approximately line 37 (note the line counter in the lower right hand corner of the editor) to reveal the code shown in Figure 3.14.

Figure 3.14 – Fear Test 1.mpc Line 37



Change F = 3 to F =5 and save the changes with the same or a new file name such as Fear_Test_1_5min_tone.mpc. Remember, if creating a new .mpc file name and are using a macro to load boxes, the file name in the macro also must be changed. Translate and compile the new or changed file as described previously and run MED-PC IV. Use the "Change Variables" screen to view/confirm the new values.

CHAPTER 4

Understanding the Data Files

Unless otherwise specified, data will be saved to C:\MED-PC IV\DATA. Data can be saved manually by selecting **FILE | SAVE DATA MANUALLY** or **FILE | SAVE DATA (FLUSH)**. The file name that is used to save the data in depends on the option that was chosen in the Hardware Configuration Utility and may also be dependent on the Subject, Experiment, and Group name provided in the MED-PC IV load wizard. Within each data file, the headings are created for each Subject, Experiment, Group, Box, etc., (see below). Data files may be opened with note pad, word pad, or any word processor or spreadsheet; however, be sure they are always saved “unformatted” in case a data extraction utility such as MED-PC to Excel might ever be used. Data file formats are explained in detail in the **MED-PC IV User’s Manual**.

Sample Data File

Select **Annotated** on the file options page during hardware installation to produce a raw data file similar to the following. Data files are located in C:\MED-PC IV\Data\ unless an alternate path was defined during hardware installation. They may be opened with note pad, word pad, or any word processor; however, make sure they are always saved unformatted in the occasion a data extraction utility such as MPC2XL is used.

```

Start Date: 01/07/09
End Date: 01/07/09
Subject: 0
Experiment: 0
Group: 0
Box: 1
Start Time: 16:01:45
End Time: 16:04:02
MSN: Fear Test 1
A:      2800.000      /Frequency of the Tone (Hz)
B:       85.000      /Amplitude of the Tone (dB)
C:       10.000      /Rise/Fall Time of the Tone (ms)
D:        0.000      /Not Used
E:        3.000      /Baseline Time (min)
F:       10.000      /Tone on Time (min)
G:        0.000      /Not Used
H:        0.000      /Not Used
I:        0.000      /Not Used
J:        0.000      /Not Used
K:        0.000      /Not Used
L:        0.000      /Not Used
M:        0.000      /Not Used
N:        0.000      /Not Used
O:        0.000      /Not Used
P:        0.000      /Not Used
Q:        0.000      /Not Used
R:        0.000      /Not Used
S:        0.000      /Elapsed Time in Session
T:        0.000      /Not Used
U:        0.000      /Not Used
V:        0.000      /Not Used
W:        0.000      /Not Used
X:        0.000      /Not Used
Y:        0.000      /Not Used
Z:        0.000      /Not Used

```